

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
12 September 2002 (12.09.2002)

PCT

(10) International Publication Number
WO 02/070029 A3

(51) International Patent Classification⁷: A61L 27/12,
27/56

(21) International Application Number: PCT/US02/05827

(22) International Filing Date: 26 February 2002 (26.02.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09/798,518 2 March 2001 (02.03.2001) US
09/960,789 21 September 2001 (21.09.2001) US

(71) Applicant (for all designated States except US):
STRYKER CORPORATION [US/US]; 2725 Fair-
field Road, Kalamazoo, MI 49005 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): DALAL, Paresh,
S. [IN/US]; 465 Boston Turnpike, F-4, Shrewsbury, MA
01545 (US). DIMAANO, Godofredo, R. [US/US]; 87

Brookhill Avenue, Edison, NJ 08817 (US). TOTH, Carol,
Ann [US/US]; 24 Upland Road, Sharon, MA 02067 (US).
KULKARNI, Shailesh, C. [IN/US]; 6 Post Oak Lane,
Apartment 12, Natick, MA 01760 (US).

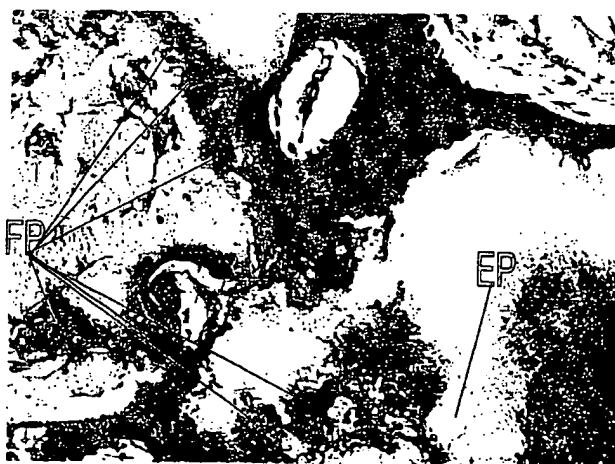
(74) Agents: HALEY, James, F. et al.; c/o Fish & Neave, 1251
Avenue of the Americas, New York, NY 10020 (US).

(81) Designated States (national): AE, AG, AL, AM, AT, AU,
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,
CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,
LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,
MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG,
SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ,
VN, YU, ZA, ZM, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM,
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR,
GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent
(BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR,
NE, SN, TD, TG).

[Continued on next page]

(54) Title: POROUS BETA-TRICALCIUM PHOSPHATE GRANULES AND METHODS FOR PRODUCING SAME



(57) Abstract: A porous β -tricalcium phosphate material for bone implantation is provided. The multiple pores in the porous TCP body are separate discrete voids and are not interconnected. The pore size diameter is in the range of 20-500 μ m, preferably 50-125 μ m. The porous β -TCP material provides a carrier matrix for bioactive agents and can form a moldable putty composition upon the addition of a binder. Preferably, the bioactive agent is encapsulated in a biodegradable agent. The invention provides a kit and an implant device comprising the porous β -TCP, and a bioactive agent and a binder. The invention also provides an implantable prosthetic device comprising a prosthetic implant having a surface region, a porous β -TCP material disposed on the surface region optionally comprising at least a bioactive agent or a binder. Methods of producing the porous β -TCP material and including bone formation are also provided.

WO 02/070029 A3

**Declarations under Rule 4.17:**

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SI, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SI, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SI, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

Published:

- with international search report

(88) Date of publication of the international search report:

6 February 2003

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 02/05827

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61L27/12 A61L27/56

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A61L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, FSTA, INSPEC, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 323 083 A (ASAHI OPTICAL CO LTD) 16 September 1998 (1998-09-16) page 2, paragraph 2 -page 3, paragraph 2 page 5, paragraph 2 -page 6, paragraph 2 page 7, paragraph 3 -page 8, paragraph 1 page 9, paragraph 2 ---	1-17, 31-33, 37, 38, 40-43, 52-54, 56-63
X	US 4 596 574 A (URIST MARSHALL R) 24 June 1986 (1986-06-24) column 2, line 3 - line 44 column 3, line 45 -column 4, line 27 --- -/--	1-6, 11-17, 31-33, 40-43,52

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *A* document member of the same patent family

Date of the actual completion of the international search

3 September 2002

Date of mailing of the international search report

11/09/2002

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Menidjel, R

INTERNATIONAL SEARCH REPORT

Int. Patent Application No
PC 1/US 02/05827

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>US 4 869 906 A (DINGELDEIN ELVIRA DR ET AL) 26 September 1989 (1989-09-26)</p> <p>column 1, line 50 -column 2, line 56 column 2, line 63 -column 3, line 35 column 4, line 42 - line 64 claims 1-7</p>	<p>1-6, 11-15, 21,31, 34-36, 40,41, 44-47, 56-63</p>
X	<p>US 5 422 340 A (ONGPIPATTANAKUL BOONSRI ET AL) 6 June 1995 (1995-06-06)</p> <p>column 8, line 38 - line 54 column 9, line 58 -column 10, line 60 column 15, line 41 - line 66 column 16, line 21 - line 58</p>	<p>1-17,19, 20, 22-33, 35-43, 45,46, 48-55, 80-85</p>
X	<p>WO 01 13970 A (DINKELAKER ALBRECHT ;PABST JOACHIM (DE); HEIDE HELMUT (DE); POBANT) 1 March 2001 (2001-03-01) page 6, paragraph 2 -page 7, paragraph 2 page 8, paragraph 1 -page 9, paragraph 3 page 10, paragraph 2 -page 11, paragraph 2</p>	<p>1-14,40</p>
X	<p>US 5 135 394 A (IRIE HIROYUKI ET AL) 4 August 1992 (1992-08-04) column 2, line 10 - line 44 column 3, line 6 - line 67 claims 1-9</p>	<p>1-12,40, 56-69</p>

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 02/05827

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☒ Claims Nos.: 70-79
because they relate to subject matter not required to be searched by this Authority, namely:
see FURTHER INFORMATION sheet PCT/ISA/210
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.1

Claims 70-79 are directed to a method of treatment of the human/animal body. Therefore, the search has not been carried out for those claims.

Continuation of Box I.1

Claims Nos.: 70-79

Rule 39.1(iv) PCT - Method for treatment of the human or animal body by therapy

INTERNATIONAL SEARCH REPORT

Information on patent family members

In International Application No
PCT/US 02/05827

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
GB 2323083	A	16-09-1998	JP 10314295 A	02-12-1998
			DE 19811027 A1	17-09-1998
			FR 2760646 A1	18-09-1998
			US 6187046 B1	13-02-2001
US 4596574	A	24-06-1986	NONE	
US 4869906	A	26-09-1989	DE 3613213 A1	22-10-1987
			AT 81785 T	15-11-1992
			AU 603356 B2	15-11-1990
			AU 7116887 A	22-10-1987
			CA 1276558 A1	20-11-1990
			DE 3782357 D1	03-12-1992
			EP 0242672 A2	28-10-1987
			ES 2044855 T3	16-01-1994
			HU 44169 A2	29-02-1988
			IE 59765 B	23-03-1994
			JP 2552483 B2	13-11-1996
			JP 62254764 A	06-11-1987
			KR 9503699 B1	17-04-1995
			ZA 8702762 A	25-11-1987
US 5422340	A	06-06-1995	US 5158934 A	27-10-1992
			AT 153535 T	15-06-1997
			AU 671721 B2	05-09-1996
			AU 6026294 A	15-08-1994
			CA 2151486 A1	21-07-1994
			DE 69403439 D1	03-07-1997
			DE 69403439 T2	23-10-1997
			DK 679097 T3	22-12-1997
			EP 0679097 A1	02-11-1995
			ES 2105641 T3	16-10-1997
			GR 3024277 T3	31-10-1997
			JP 8505548 T	18-06-1996
			WO 9415653 A1	21-07-1994
			US 5409896 A	25-04-1995
			US 5604204 A	18-02-1997
WO 0113970	A	01-03-2001	DE 19940717 A1	01-03-2001
			AU 7511200 A	19-03-2001
			WO 0113970 A1	01-03-2001
			EP 1206292 A1	22-05-2002
US 5135394	A	04-08-1992	JP 2182261 A	16-07-1990
			JP 2182250 A	16-07-1990
			JP 2182251 A	16-07-1990
			JP 2683401 B2	26-11-1997